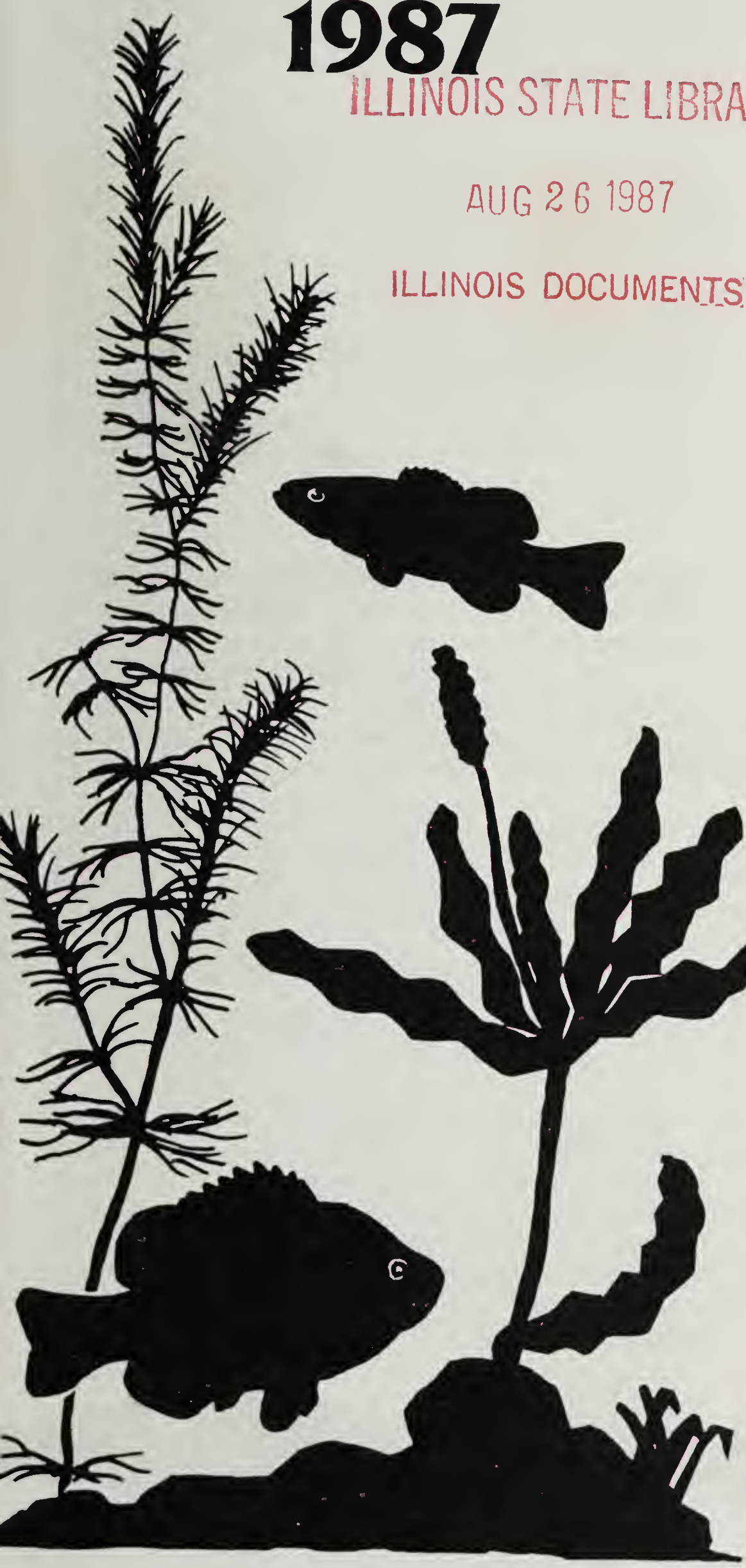
GUIDE TO EATING ILLINOIS SPORT FISH

1987



We are dependent upon more than 60,000 chemical substances manufactured in the United States to provide us with an abundant food supply, a wide variety of drugs and a host of synthetic materials. As the use of synthetic chemicals increases, the risk of human exposure to potentially hazardous substances also rises. The purpose of this pamphlet is to provide information to people who may be exposed to some of these chemicals in sport fish.

In 1977 four State agencies—the Department of Public Health, the Department of Conservation, the Department of Agriculture and the Illinois Environmental Protection Agency—began gathering information concerning fish tissue that could be contaminated by toxic chemicals. The investigations center on the organochlorine compounds used to make pesticides and polychlorinated biphenyls. This group of chemicals can contaminate fish and, in turn, potentially threaten the health of those who regularly eat contaminated fish. The program provides the information necessary for the Department of Public Health to issue sport fish health advisories, aids the Illinois EPA in identifying the location of toxic problems and water quality trends and assists the Department of Conservation with data on the availability of various aquatic environments to support abundant, useful and diverse communities of fish in streams and impoundments in Illinois.

Since the inception of the program, sport fish health advisories have been issued when contaminants in the representative fish tissue samples reach a level that may be a public health concern. Although the effects of long-term, low-level exposure to these environmental toxicants are generally unknown, some of the organochlorine chemicals which are included in the cooperative testing program are suspected of causing cancer.

The sport fish health advisory table contains all of the current statewide advisory information. It is strongly recommended that people use the information presented in this pamphlet to make informed judgments about the type and amount of fish to be consumed in order to limit their exposure to contaminants.

1987 Sport Fish Health Advisories for Illinois Waters

Organochlorine Contamination in Fish

WATER BODY	LEVEL OF CONTAMINANTS		
	Group 1 Low	**Group 2 Moderate**	**Group 3 High**
Lake Michigan	Lake trout up to 20" Coho salmon up to 26" Chinook salmon up to 21" Brook trout Rainbow trout Pink salmon Smelt Perch	Lake trout 20-23" Coho salmon over 26" Chinook salmon 21-32" Brown trout up to 23"	Lake trout over 23" Chinook salmon over 32" Brown trout over 23" Carp Catfish
Lake Springfield	White crappie Carp under 26" Largemouth bass under 13.5" Flathead catfish under 16"	Largemouth bass over 13.5" Bigmouth buffalo	Channel catfish Carp of 26" Flathead catfish over 16"
Lake Decatur		Channel catfish Flathead catfish Bigmouth buffalo	
Lake Taylorville		Carp Channel catfish Bigmouth buffalo	
Clinton Lake		Channel catfish	
Des Plaines R. from Lockport to Kankakee R. confluence		Carp Channel catfish Smallmouth buffalo Drum	
Illinois R. headwater to Starved Rock dam		Carp	
Paris Twin Lakes		Channel catfish	
Mississippi R. (below L & D 22, south of Hannibal, MO to Cairo, IL)			Shovelnose sturgeon Shovelnose sturgeon eggs
Mississippi R. (St. Louis to Cairo, IL)			Catfish Carp

Group 1: *Lowest level of contaminants.*

Group 2: *Moderate levels of contaminants; children, pregnant women, women who may become pregnant and nursing mothers should not eat Group 2 fish; all others should limit their consumption of these fish to one meal per week.*

Group 3: *High levels of contaminants; no one should eat Group 3 fish.*

Questions about the Fish Conta

What chemicals are tested?

The thirteen commercial pesticides and the industrial lubricant that are listed in the following table comprise the testing program. These products are manufactured from carbon and chlorine and are classified as organochlorine compounds. Chlordane, heptachlor, aldrin and dieldrin have the same components but their circular molecular structure further identifies them as cyclodiene pesticides. To aid in the identification of new sources and types of potential contamination, some whole fish samples are also analyzed for about 50 additional chemicals.

Why were they selected?

The environmental toxicants listed in the table were selected for the routine fish tissue testing program because they are widely dispersed in the environment and are persistent and common. Over the years most of these compounds have been cancelled, suspended or restricted by USEPA; however, their persistence in the environment over long periods of time and their poor solubility in water have resulted in contamination of the aquatic food chain.

How are fish tested for contamination?

A state fish contaminant monitoring network has been established. Department of Conservation biologists sample representative species from designated areas in the network. The samples are carefully prepared and frozen for shipment to the Department of Public Health, the Department of Agriculture and the Illinois EPA laboratories for testing. The U.S. Food and Drug Administration standards that are used in this program call for testing the edible portion of the fish. The tissue samples are taken from the boneless, scaleless skin-on fillet from one side of the fish. (Catfish and bloater chubs are exceptions.) A standard testing protocol using gas chromatography has been developed to measure the samples for contamination. The laboratory results are then compared against the U.S. Food and Drug Administration tolerance levels which are used in determining whether to issue a health advisory.

ninant Monitoring Program

Chemicals Included in the Testing Program

Parameter	Status	USFDA Tolerance Level (ppm)
Aldrin	Pesticide. Most uses cancelled since 1975.	0.3
Benzene Hexa-chloride (BHC)	Pesticide. All uses eliminated in 1978.	0.5
Chlordane	Pesticide. Most uses cancelled in 1980.	0.3
DDT & similar chemicals	Pesticide. Most uses cancelled since 1971.	5.0
Dieldrin	Pesticide. Most uses cancelled since 1975.	0.3
Endrin	Pesticide. Uses are restricted.	0.3
Heptachlor	Pesticide. Most uses cancelled in 1983.	0.3
Heptachlor epoxide	Pesticide. Most uses cancelled in 1983.	0.3
Hexachloro-benzene (HCB)	Pesticide still in use.	*
Lindane	Pesticide. Uses are restricted.	*
Methoxychlor	Pesticide still in use.	*
Mirex	Pesticide and component of a fire retardant. Most uses cancelled in 1977.	0.1
Poly-chlorinated Biphenyl (PCB)	Industrial lubricant. Manufacture eliminated in 1970.	2.0
Toxaphene	Pesticide. Most uses cancelled in 1982.	5.0

**No established USFDA tolerance level in fish.*

How are tolerance levels determined?

The U.S. Food and Drug Administration has established acceptable levels of chemical residues in fish called tolerance levels that will protect human health while allowing for the harvesting of fish. The tolerance levels shown in the table were established by USFDA for regulation of commercial fishing and the same levels have been adopted in Illinois for sport fishing.

What happens when a fish sample contains more than the allowable amount of contamination?

Usually, when an excursion (a concentration of contaminants that is the same or higher than the USFDA tolerance level) occurs, additional tissue samples will be analyzed to confirm the test results. A single excursion does not mean that there is need for a health advisory. Many fish that exceed the USFDA recommendations would have to be consumed over a long period before an individual's health would be affected.

How can health advisories be interpreted when information about a particular species is not included on the health advisory chart?

The Department of Conservation biologists collect fish at selected locations from indicator species, that is, the most abundant fish in each of the three different feeding classifications:

Feeding Classification	Items in Diet	Examples of Species
Predators	Smaller fish/insects	Bass, crappie, bluegill, salmon, trout
Omnivores	Smaller fish/plants/ insects/crayfish	Catfish, bullhead
Bottom feeders	Insects/plant and animal remains	Carp, redhorse

Generally, the omnivores accumulate higher levels of organochlorines because these fish contain higher levels of fats which is where the toxicants tend to accumulate. It is also suspected that bioconcentration (uptake from direct contact with contaminants) may be a significant factor in this feeding group because omnivorous fish lack the extra protection offered by scales.

When no specific information is listed in the health advisory about a particular fish, use the information about the indicator species. For instance, it can be assumed that if largemouth bass is listed as below tolerance levels, there is no reason to suspect that other predators such as crappie or bluegill are unsafe.

Are fish contaminant levels the same in lakes and streams?

Contaminants do not accumulate at the same rate in all fish species. This is due in part to differences in body fat, habitats, growth rates, feeding behavior and, of course, the amount and type of contamination found in the lakes and rivers. Usually, fish that are older and larger tend to have higher levels of contaminants. For instance, fish in lakes may have higher contaminant levels than the fish population living in the streams that feed the lakes. The variable water velocity in rivers and streams carries the poorly soluble organochlorine compounds, which are attached to silt and clay particles, to an area where slow moving water allows the sediment to settle to the bottom. The quiet water in lakes and impoundments tends to act as a sink or disposal area for silt and clay. Generally, the laboratory analyses of samples from the fish population in the relatively closed environment of an impoundment will tend to have consistently higher contaminant levels while analyses from the more mobile fish that migrate through the rivers will tend to be variable because the fish are exposed to a varied environment.

How do organochlorines build up in the tissues of fish and humans?

Usually, contamination occurs through the food chain. Organochlorines have poor solubility in water but good solubility in organic materials such as fats and, therefore, tend to accumulate in fat-rich tissues in animals. The poorly soluble chemicals are washed into nearby waterways and build up in silt or stick to aquatic weeds or insects. When fish eat the contaminated organisms, some of the toxicants will be eliminated as body waste but some may accumulate in the fatty tissue of the fish. This process is called bioaccumulation. When the contaminated particles are absorbed directly, such as through the fish's gills, it is referred to as bioconcentration.

Can the risk of exposure to contamination be reduced by special preparation of the fish before eating?

The fat-soluble contaminants can be reduced by removing the skin and any fatty tissue beneath the skin near the belly or dorsal area of a large fish. Although the evidence is not conclusive, it appears that contamination is lower in cooked fish because cooking melts some of the fat where pollutants have accumulated. Therefore, it is recommended that fish be broiled or baked on an elevated rack which will allow the fat to drip away from the finished meal. Boiling or poaching are also acceptable ways to cook fish but the broth should be discarded.

Is fish contamination from organochlorine compounds increasing or decreasing in Illinois?

Decreasing. There is a general downward trend in many parts of the State. There are areas, however, where certain species continue to show evidence of contamination levels that are of concern. Monitoring for these organochlorines as well as new chemicals is necessary.

This publication is intended to serve as a guide. Detailed information about the program described in this booklet is available in "Illinois Fish Contamination Monitoring Program." Individual copies are available without charge by writing:

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ILLINOIS DEPARTMENT OF AGRICULTURE

Illinois Department of Conservation
life and land together

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

The Illinois Fish Contamination Monitoring Program is a cooperative effort between the Department of Agriculture, the Department of Conservation, the Illinois Environmental Protection Agency and the Department of Public Health.

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